ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

7177 North Austin Avenue
Niles, Illinois 60648
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17032 S 2/13/87

RCRA
Pretreatment
User Charge

Sanitary District
Testing
Consulting

Mr. Greg Verret
Environmental Resources Management
102 Wilmot Road, Suite 300
Deerfield, IL 60015

Subject: Flow Study at Finley Creek

Dear Mr. Verret:

Attached are the results of the flow measurement test conducted at and around Finley Creek, north of Indianapolis, Indiana.

A known concentration of lithium chloride was injected into the waterways at a set rate. Samples of the water were collected down stream from the injection points, and analyzed for lithium content. By determining the dilution of the lithium, the flow rate at the waterway can be calculated.

Injection and sampling proceeded smoothly at both Finley Creek and the unnamed ditch leading into the creek. Sampling was also conducted downstream of the confluence.

The attached laboratory report sheets show lithium concentrations to be lower in the ditch than in Finley Creek, indicating a much higher flow in the ditch. We feel that the low lithium concentrations detected were due to insufficient velocity and the meandering characteristics of the ditch. Flow measurement of the ditch is not calculated by lithium concentration, but by subtracting the calculated flow from Finley Creek from the calculated flow after the confluence.

The six data points used correspond to a 20 minute period, which is the duration of injection. As you can see from the graph, the remaining data points fall out of the useful area. Average concentration was calculated by using the average value of the curve for the 20 minute period.

Injection and sampling was conducted on May 13th, 1987 from 2:00 pm - 4:00 pm. The flow from Finley Creek and the unnamed ditch will fluctuate with rainfall, humidity and temperature. The data collected represents the flow rate for that day only.

Flow equation for Finley Creek:

Lithium chloride injected at 11/105 sec. at a concentration of 2990 mg/l = 28.476 mg/sec.

The effluent sampled had an average concentration of 0.4298 mg/l.

$$2990 \text{ mg/l} \times \frac{11}{105 \text{ sec.}} = 0.430 \text{ mg/l} \times y \text{ l/sec.}$$

$$= 66.22 \text{ l/sec.}$$

$$y = 17.52 \text{ gal/sec.}$$

Flow equation for the combined flow of Finley Creek and the unnamed ditch:

Average lithium chloride concentration of the combined stream was 0.427 mg/l (20 minutes) minus the detected concentration of the lithium in the unnamed ditch 0.025 mg/l yields a concentration of 0.402 mg/l.

$$2990 \text{ mg/l} \times \frac{11}{105 \text{ sec.}} = 0.402 \text{ mg/l} \times z \text{ l/sec.}$$

$$= 70.84 \text{ l/sec.}$$

$$z = 18.74 \text{ gal/sec.}$$

Flow of the unnamed creek can be calculated by subtracting the Finley Creek flow from the combined flow:

Combined flow	18.74 gal/sec.
Finley Creek flow -	17.52 gal/sec.
Unnamed ditch flow	1.22 gal/sec.

Errors inherent in this type of flow measurement are: poor mixing, large pools or eddys, inconsistancies in injection, sampling from a low flow and/or non-turbulant area, and cross contamination of sample. Great care was taken to keep these errors to a minimum. We estimate the accuracy of the data to be $\pm$15%.

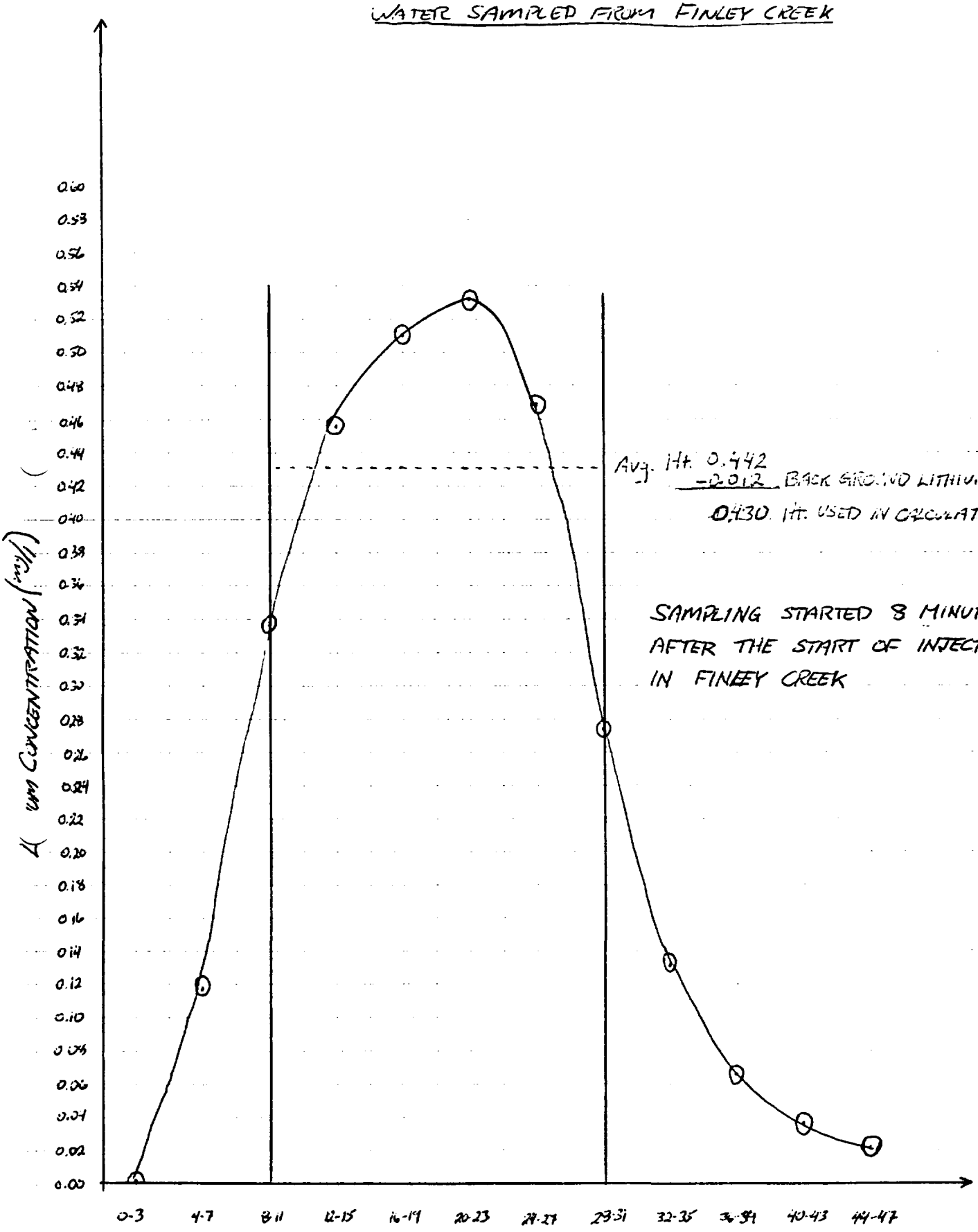
If you need any other documentaiton, or if you have any questions, please do not hesitate to call.

Sincerely,

Keith Gray

Keith Gray
May 26, 1987

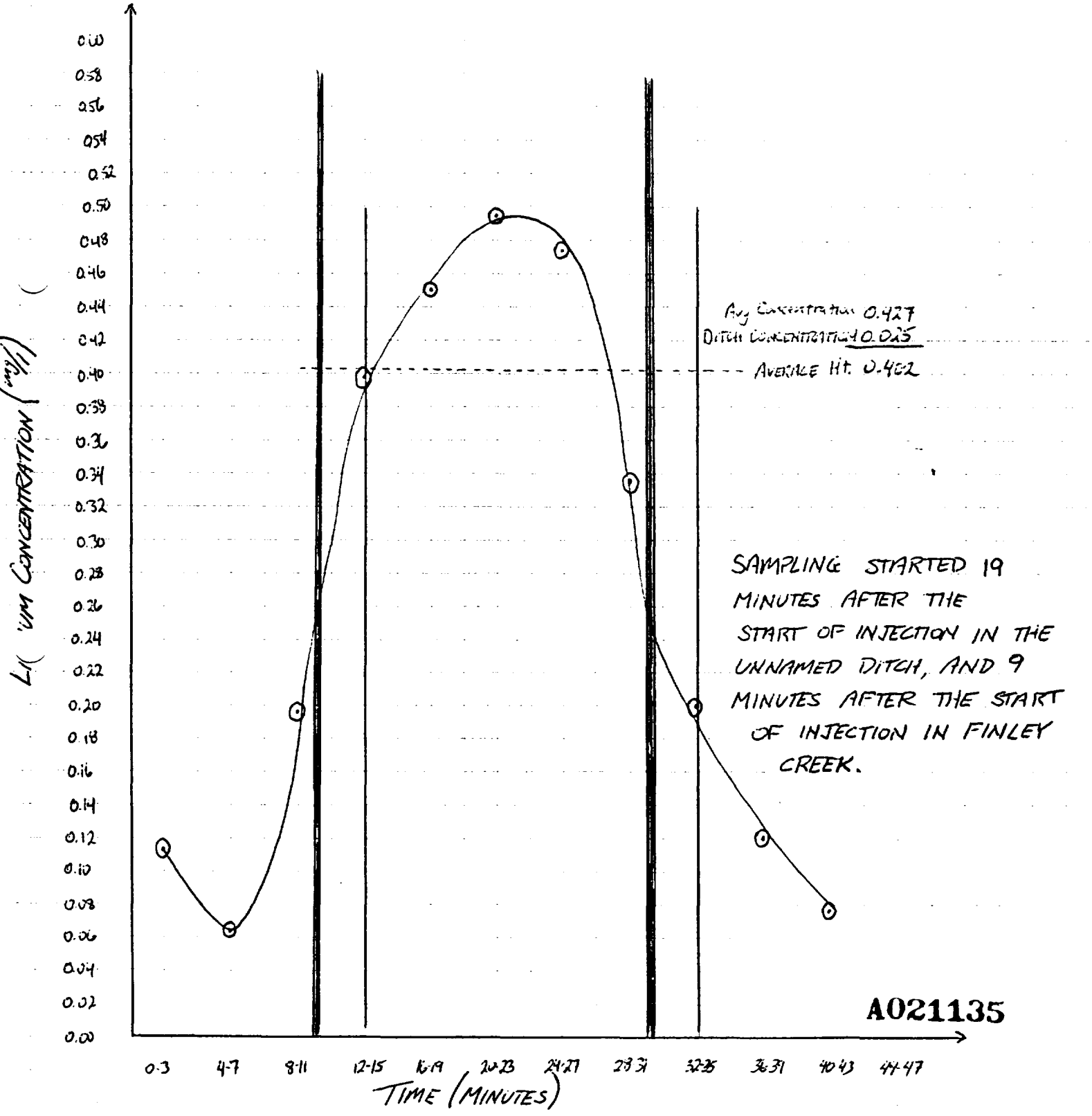
GRAPH OF LITHIUM CONCENTRATION VS TIME
WATER SAMPLED FROM FINLEY CREEK



A021134

SAMPLES WERE COLLECTED EVERY MINUTE, AND MIXED EVERY FOUR MINUTES INTO 4 MINUTE COMPOSITE SAMPLES

GRAPH OF LITHIUM CONCENTRATION (mg/l) v TIME (MIN)
WATER SAMPLED FROM THE CONFLUENCE OF
FINLEY CREEK AND THE UNNAMED DITCH



A021135

SAMPLES WERE COLLECTED EVERY MINUTE, A MIXED EVERY 4 MINUTES INTO 4 MINUTE COMPOSITE SAMPLES.

TEI ANALYTICAL, INC.

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May 20, 1987

LABORATORY REPORT

#6561 - 1

EMT (ERM)
7177 N. Austin
Niles, IL 60648

Attn: Mike Gower

SAMPLES RECEIVED: 05-13-87

Lithium

EI No.	SAMPLE IDENTIFICATION		
43581	Finley Creek Blank	0.012	mg/l
43582	Finley Creek #0	<0.005	mg/l
43583	Finley Creek #1	0.119	mg/l
43584	Finley Creek #2	0.339	mg/l
43585	Finley Creek #3	0.457	mg/l
43586	Finley Creek #4	0.510	mg/l
43587	Finley Creek #5	0.532	mg/l
43588	Finley Creek #6	0.467	mg/l
43589	Finley Creek #7	0.274	mg/l
43590	Finley Creek #8	0.132	mg/l
43591	Finley Creek #9	0.067	mg/l
43592	Finley Creek #10	0.038	mg/l
43593	Finely Creek X	0.022	mg/l
43594	Unnamed Ditch Blank	0.012	mg/l
43595	Unnamed Ditch #1	0.054	mg/l
43596	Unnamed Ditch #2	0.021	mg/l
43597	Unnamed Ditch #3	0.021	mg/l
43598	Unnamed Ditch #4	0.021	mg/l
43599	Unnamed Ditch #5	0.021	mg/l
43600	Unnamed Ditch #6	0.020	mg/l
43601	Unnamed Ditch #7	0.021	mg/l
43602	Unnamed Ditch #8	0.016	mg/l
43603	Unnamed Ditch #9	0.020	mg/l
43604	Unnamed Ditch #10	0.016	mg/l
43605	Unnamed Ditch X	0.045	mg/l
43606	Comp Blank	<0.005	mg/l
43607	Comp #1	0.113	mg/l
43608	Comp #2	0.061	mg/l
43609	Comp #3	0.198	mg/l
43610	Comp #4	0.399	mg/l

A021136

G. E. Marks

Gayle E. Marks, Ph.D.

TEI ANALYTICAL, INC.

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May 20, 1987

LABORATORY REPORT #6561 - 2

EMT (ERM)
7177 N. Austin
Niles, IL 60648

Attn: Mike Gower

SAMPLES RECEIVED: 05-13-87

Lithium

EI No.	SAMPLE IDENTIFICATION		
43611	Comp #5	0.449	mg/l
43612	Comp #6	0.495	mg/l
43613	Comp #7	0.476	mg/l
43614	Comp #8	0.336	mg/l
43615	Comp #9	0.200	mg/l
43616	Comp #10	0.120	mg/l
43617	Comp X	0.079	mg/l
43618	Finley Creek LiCl	2990.	mg/l
43619	Unnamed Ditch LiCl	3310.	mg/l

A021137

G. E. Marks

Gayle E. Marks, Ph.D.